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ABSTRACT

For research into the usefulness of attention-gaining devices in informational films, five film versions on machine shop measuring instruments were produced. These versions were termed: basic, visual relevant, visual irrelevant, sound relevant, and sound irrelevant. Attention-gaining devices were placed at the same points in all but the basic version. The experiment was conducted with two populations--Army recruits and Navy recruits--randomly divided into six comparable groups. Each of five groups were shown one of the experimental film versions and, afterwards, were tested for learning of factual information and for recall of the attention devices. The sixth (control) group took the information test without seeing the film. No evidence was found that relevant devices add to the effectiveness of an informational film. There was evidence that irrelevant sound devices detract. No significant difference was found between the effectiveness (or ineffectiveness) of visual and sound devices. Ability to recognize and remember which devices were used in a film version was practically independent of learning from that version. On the basis of these findings, the recommendation is made that producers of training films present the subject matter in a simple, straightforward way. (MF)

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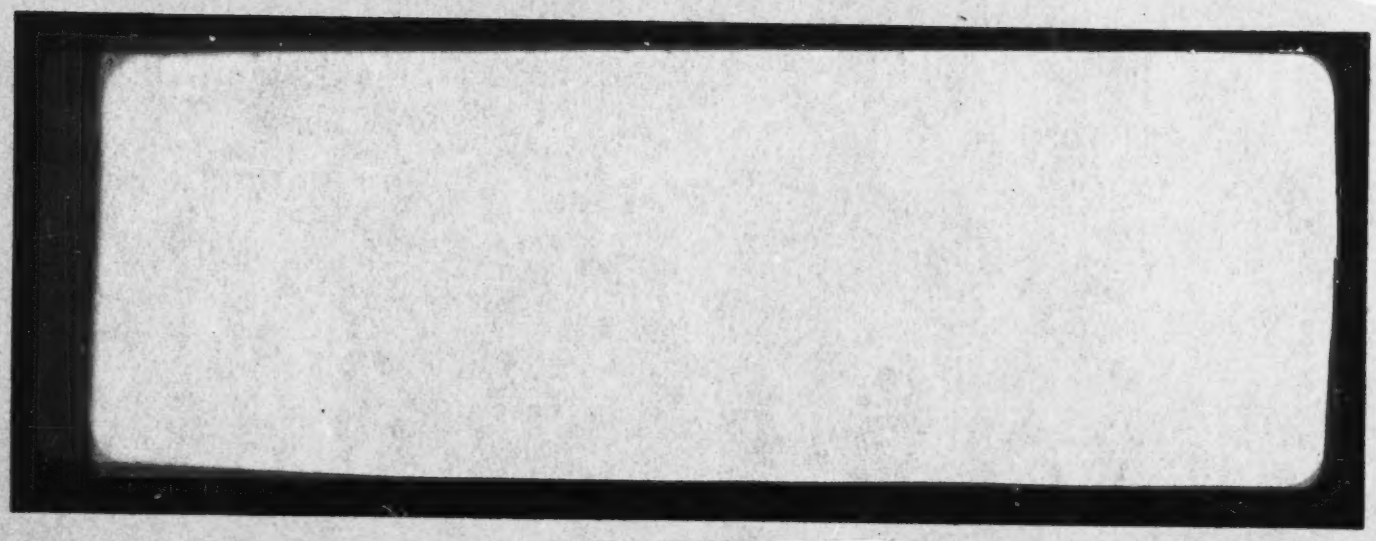

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TECHNICAL REPORT - SDC 269-7-9

THE EFFECT OF ATTENTION GAINING DEVICES ON FILM-MEDIATED LEARNING

(Rapid Mass Learning)

The Pennsylvania State College
Instructional Film Research Program
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SUMMARY

Introduction

Devices used to draw attention to particular points of the content of a film may be divided into two broad classes: relevant devices and irrelevant devices.

"Relevant devices" include any emphasis technique that is related to or operates on a specific point to be emphasized in a film. For example, an ultra close-up of a part of a gun brings attention specifically and forcefully to that part of the gun.

"Irrelevant devices" include any emphasis techniques that call attention to the screen, but are other wise unrelated to film content. For example, interrupting a film on a technical subject with a shot of a bathing beauty is an instance of an "irrelevant device."

Hypotheses. Three hypotheses were formulated for testing:

1. Device relevancy. Film-mediated learning will be facilitated by the use of relevant attention-gaining devices, and inhibited by irrelevant attention-gaining devices.

2. Device medium. Informational learning from films will be equally facilitated by visual and sound attention-gaining devices of the same relevance.

3. Device recall. The hypothesis is that recall of the devices themselves will be relatively independent of the learning of the factual information in the films.

Experimental Procedure

The Films. To test the above hypotheses, five versions of a film on the use of machine shop measuring instruments, were produced. These versions were as follows:

1. Basic Version: Contains no experimental attention-gaining devices, but presents a clear, straightforward treatment of the subject.

2. Visual relevant: Contains attention-gaining devices in the visuals that are related to the points of content being emphasized.

3. Visual irrelevant: Contains attention-gaining devices in the visuals that are unrelated to the points of content being emphasized.

4. Sound relevant: Contains attention-gaining devices in the sound track that are related to the points being emphasized.

5. Sound irrelevant: Contains attention-gaining devices in the sound track which are unrelated to the points being emphasized.

Attention-gaining devices were placed at the same points in versions 2 through 5, and each version had 26 devices.

The Tests. Two tests were constructed to provide measures of (1) learning of factual information, and (2) the recall of the attention-gaining devices.

The Populations. The experiment was conducted with two populations - Army recruits and Navy recruits. At each testing center companies of recruits were randomly divided into six comparable groups. Five of the groups were each shown one of the experimental film versions, and immediately after they took the information and device recall tests. The sixth (control) group took the information test without seeing the film.

Results

Device relevancy. There is no evidence that the insertion of relevant attention-gaining devices of the kind used in this study adds to the effectiveness of an informational film. There is some evidence that irrelevant sound attention-gaining devices detract from the teaching effectiveness of such a film (for both populations the sound irrelevant version yielded the lowest scores).

Device medium. No significant difference was found between the effectiveness (or ineffectiveness) of visual and sound attention-gaining devices.

Device recall. Ability to recognize and remember which devices were used in a film version was practically independent of learning from that version.

Recommendations

1. Where instruction is the principal aim, and cost a consideration, producers of training films should present the subject matter in a simple straightforward way, and avoid the use of such fancy film techniques as spotlighting, extreme magnification, zooms and stop motion, to gain the learners' attention.

2. If it seems necessary in an instructional film to attract or direct the learners' attention, use a technique which will emphasize something already in the film -- some special treatment of the subject content -- rather than introduce extraneous or irrelevant materials.

THE EFFECT OF ATTENTION-GAINING DEVICES ON FILM-MEDIATED LEARNING[1]

D. Morgan Neu

INTRODUCTION

Film makers have employed a wide variety of techniques to achieve emphasis and increase the teaching effectiveness of their products. In general, the devices employed to draw attention towards particular points of the content presented may be divided into two broad classes: relevant devices and irrelevant devices. "Relevant devices" include any emphasis technique that is related to or operates upon the specific point to be emphasized. For example, an ultra-close-up of part of a gun brings attention specifically and forcefully to that part of the gun. "Irrelevant devices" include any emphasis techniques that call attention to the screen but are otherwise unrelated to the film content. For example, interrupting a film on a technical subject with a shot of a bathing beauty is an instance of an "irrelevant device."

While current learning theories and the experiments that support them are not entirely in accord on the relative effectiveness of these two methods of ensuring the perception and learning of the salient points in a lesson, the consensus seems to be that, in the long run, "relevant devices" should facilitate recall, while "irrelevant devices" should act as distractors and inhibit recall. This inference is obviously at variance with the results hoped for by producers who insert sequences that attract attention to the screen without relating to a specific point of information. It is important, therefore, to determine experimentally the effects on learning of such different attention-gaining techniques.

STATEMENT OF THE PROBLEM AND HYPOTHESES

The major purpose of this study was to determine the relative effectiveness of three levels of attention-gaining devices: (1) relevant devices, (2) no devices at all, (3) irrelevant devices. Since it is possible to insert devices in the sound track or the visuals, the role of the medium of presentation has also been studied. In order to maintain a clear cut comparison between the sound and visual media, sound and visual attention devices were each studied separately. Three hypotheses were formulated for testing as follows:

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1 This report is based on a dissertation submitted in partial fulfilment of requirements for the degree of Doctor of Philosophy at The Pennsylvania State College, June 1950

1. Device relevancy. The hypothesis is that film-mediated learning will be facilitated by the use of relevant attention-gaining filmic devices, and inhibited by irrelevant attention-gaining devices. The hypothesis was tested by comparing versions of a film containing, respectively, relevant devices, no devices, and irrelevant devices.

2. Device medium. The hypothesis is that film-mediated informational learning will be equally facilitiated by visual and sound devices of the same relevance. The hypothesis was tested by comparing learning from visual device versions with learning from sound device versions. This comparison is made separately for relevant and irrelevant devices.

3. Device recall. The hypothesis is that recall of the devices themselves is relatively independent of learning of the factual information content of the film.

EXPERIMENTAL DESIGN AND PROCEDURES

The Experimental Films

To accomplish the comparisons required by the hypotheses, five versions of a film presenting an introduction to machine shop measuring instruments were produced. The five versions included the following:

1. Basic (identified as B in the tables): contains no experimental emphasis devices, but gives a clear, straightforward treatment of the subject.

2. Visual relevant (VR): contains attention-gaining devices in the visuals that are related to the points of content being emphasized.

3. Visual irrelevant (VI): contains attention-gaining devices in the visuals that are unrelated to the points of content being emphasized.

4. Sound relevant (SR): contains attention-gaining devices in the sound track that are related to the points being emphasized.

5. Sound irrelevant (SI): contains attention-gaining devices in the sound track that are unrelated to the points being emphasized.

Choice, number, and placement of the devices. To ensure satisfactory comparability among the four "device" versions, a panel of judges selected four sets of devices considered to be comparable in intensity and probable effectiveness in gaining attention.

It was decided that the devices selected should not add information to the film, but should be used solely for their possible attention-gaining value. Furthermore, it was decided to select attention-gaining devices that would represent various categories of stimulus conditions: movement and change,

size, intensity, repetitive or prolonged contact, novelty and peculiarity, impressiveness, and sudden contrast.

A device was inserted at each of the same twenty-six most important points in each version. Table I lists the devices and their placement in relation to the informational content of the film. Thus, a point emphasized in one version by a visual relevant device (e.g., a spotlight) is also emphasized in the other three versions, by appropriate devices. It will be noted that some devices are used more than once.

The Tests

Two tests were constructed to provide measures of (1) learning of information and (2) recall of devices. The information test comprised 104 multiple-choice objective-type items, of which 25 provided picture-choices rather than verbal choices. This test had a high reliability (.94 by Kuder-Richardson Formula 20).

The device recall test included 77 items, each of which briefly identified a device by a short statement. The subjects were called upon to check whether (1) the item was in the film, (2) the item was not in the film, or (3) they did not remember whether it was in or not.

The Populations

The experiment was conducted with two separate military populations: (1) 1576 Army recruits at Fort Dix, New Jersey, (2) 1055 Navy recruits at The Great Lakes Naval Training Station, Great Lakes, Illinois.

Procedures

At each testing center, the following procedures were employed: intact companies of recruits were divided at random into six comparable groups. Five of these groups were each shown one of the five film versions (B, VR, VI, SR, or SI) and, immediately after the film, given the information test and the device recall test. The sixth (control) group was given the information test without having seen the film. Test responses were recorded on IBM answer sheets, and machine-scored.

Statistical Treatment of the Data

For the men in each population both a measure of general intelligence and a measure of mechanical aptitude were available. Mean scores for the information test for the six treatments were calculated, and these means were adjusted, by an analysis of co-variance, to take into account small differences in initial ability as measured by the general intelligence and mechanical aptitude tests.

TABLE 1

DESCRIPTION OF ATTENTION-

Basic Version	Visual Relevant	Visual Irrelevant
1. Three metal blocks, rectangular, square, and round, are used to		
	White line appears on each block to emphasize length, width, and depth.	Concentric circles flash on screen as length, width, and depth are mentioned.
2. The scale graduations on each end and both sides of the steel rule		
	Each scale graduation is spot lighted as it appears.	Train-crossing signals flash on before each graduation appears.
3. A hook rule is used to measure from the shoulder of a metal block.		
	The rule appears to move by itself onto the shoulder.	Still shot of an athelete in action appears before and after rule is put on shoulder.
4. A slender flexible rule is held up for close-up shot.		
	End of rule is bent back and released which causes it to vibrate.	Portrait of pretty girl appears before flexible rule is discussed.
5. The steel rule is shown so that the worn corners on one end are		
	Extreme close-up of this worn end.	The entire scene is tinted pink.
6. The steel rule is wiped with an oiled rag several times:		
	Picture of oil can is flashed on the screen with the mentioning of oil.	Picture of cow's tail.

Sound Relevant	Sound Irrelevant
illustrate length, width, and depth:	
Long, short, and low tones emphasize length, width, and depth.	Auto horn sounds as length, width, and depthare mentioned.
are shown one at a time.	
A female voice names each graduation as it appears.	A train whistle sounds before each appearance of the graduations.
Before hook rule appears commentator says, "Now hear this. You are to remember....."	Commentator loudly clears throat before discussing hook rule.
A 2nd male voice gives the name of the rule.	Sound of buzzing airplane before flexible rule is described.
plainly visible:	
The commentary is read, slowly with emphasis.	Sound of applause in the background of entire scene.
A squeaking sound is heard as oiled rag is rubbed across rule.	Fire siren starts when rule is rubbed with oiled rag.

TABLE 1 (Con't)

Basic Version	Visual Relevant	Visual Irrelevant
7. The spring caliper is closed properly by squeezing the legs together:		
	Picture of hand squeezing the 1st and 2nd fingers of other hand together.	Concentric circles appear as caliper legs are closed.
8. A group of adjustable precision instruments (micrometer and vernier		
	As each is mentioned, one micrometer and one vernier caliper turns around by itself.	Picture of a hammer hitting a nail as each instrument is mentioned.
9. Two parts of the micrometer, the barrel and thimble, are discussed:		
	Finger points to the thimble.	Shot of a smoke stack before thimble is mentioned.
10. A piece of paper is drawn between the micrometer's measuring surfaces		
	Close-up of paper being drawn through.	Picture of turkey's head appears.
11. Micrometer is adjusted to show that graduations should line up to zero		
	Spot-light on measuring surfaces and on scale graduations.	Shot of close-up of two eyes looking at camera.
12. Micrometer is twirled to show "wrong way" of obtaining rapid adjustment.		
	Micrometer is twirled very rapidly.	Picture of man getting hit in the jaw.

Sound Relevant	Sound Irrelevant
Crunching sound as caliper legs are closed.	Sound of music as caliper legs are closed.
caliper) are shown on workbench:	
The word micrometer, said with a rising inflextion, is followed by an ascending whistle. After the word vernier caliper is said with falling inflextion, a descending whistle follows.	After each word is said, a gurgling sound - like pouring liquid from a jug-is made.
A 3rd male voice names the thimble.	Sound of squeaking door before thimble is mentioned.
to clean them.	
Resinous twang is heard as paper is pulled through.	Sound of cuckoo clock as paper is pulled through.
when measuring surfaces are closed:	
2nd male voice reads commentary.	Sound of sawing wood.
Ratchet sound while micrometer is twirled.	Sound of miscellaneous objects falling down and breaking. (Fibber McGee's closet.)

TABLE 1 (Con't)

Basic Version	Visual Relevant	Visual Irrelevant
13. Micrometer approaches moving object in lathe as if to measure it:		
	Restraining hand stops the micrometer.	Scene goes in and out of focus.
14. A micrometer which measures from three to four inches is called a		
	Six-inch steel rule is placed alongside micrometer.	Concentric half-circles appear on the screen.
15. The vernier caliper is used to measure a part in a lathe:		
	Part of scene at unusual angle from under the operator's arm.	Picture of profile of man's face.
16. Snap gage is shown in comparison with a micrometer in background.		
	Snap gage is moved to extreme close-up in foreground with micrometer in background.	Pitcher throws ball at camera.
17. The three parts of the snap gage (anvil, go button and not-go button)		
	Finger points to each part as it is mentioned.	Concentric half circles appear before each part is mentioned.
18. A part is inserted in a ring gage several times:		
	Zoom to close up.	Picture of man lying on ground, feet nearest camera.

Sound Relevant	Sound Irrelevant
Commentator says, "Now watch this closely."	Sound of jazz music.

four inch micrometer.

Female voice reads commentary.	Sound of water splash and gurgling effect.
Background sound of lathe running.	Sound of baby crying.
3rd male voice reads commentary.	Sound of breaking glass.

are described as gage is shown on workbench:

Sound of anvil when anvil is mentioned, sound of "go" police whistle for go-button, and "stop" whistle for not-go-button.	Sound of horse whinnying as each part is mentioned.
Ascending whistle when part is inserted in gage.	Pistol shot when part is inserted in gage.

TABLE 1 (Con't)

Basic Version	Visual Relevant	Visual Irrelevant
19. ~~Snap~~ gage is inspected for accuracy with gage blocks:		
	Circular mask to concentrate attention on gage blocks.	Picture of locomotive coming at camera.
20. Straight plug gages and taper plug gages are shown on the workbench:		
	All but one straight gage disappear and reappear. All but one taper gage disappear and reappear.	Picture of baby as each group of gages is mentioned.
21. Shot of hole in metal part. Hole contains many burrs:		
	Burrs gradually disappear by a dissolve.	Picture of airplane diving through sky.
22. Measuring instruments are being checked in inspection laboratory:		
	Shot of large white check mark.	Picture of hammer hitting nail.
23. Gage blocks are used to check setting of fixed gage:		
	Unusual angles: Close up of gage with inspector's eye appearing through curve of gage; gage is seen in silhouette.	Still picture of athlete in action.
24. Two gage blocks are "wrung" together:		
	Circular mask makes operation appear as through a hole.	Picture of gun being fired at camera.

Sound Relevant	Sound Irrelevant
2nd male voice reads commentary.	Sound of fog horn.
After "straight plug gages" said with rising inflexion, an ascending whistle. After "taper plug gages" a descending whistle.	Sound of drum roll as each group is mentioned.
Sound of filing metal as burrs disappear.	Sound of telephone as burrs disappear.
Voice says, "O. K."	Sound of hammer hitting nail.
Female commentary.	Sound of rooster crowing.
Sound of woman's scream as blocks are "wrung" together.	Sound of coughing as blocks are "wrung."

TABLE 1 (Con't)

Basic Version	Visual Relevant	Visual Irrelevant
25. Shot of projection comparator:		
	Hand points to the comparator.	Picture of girl's legs.
26. Shot of the interference bands produced by the light wave instrument:		
	Extreme close-up of the interference bands.	Picture of boy and girl kissing.

Sound Relevant	Sound Irrelevant
2nd male voice reads commentary.	Sound of "gibberish" (Donald Duck)
Sound of voice counting, "1, 2, 3, 4, 5."	Sound of kiss and sigh.

The adjusted means therefore reflect the performance to be expected of groups having equal mean general intelligence scores and equal mean mechanical aptitude scores.

To determine the relationship between the information test and the device test, scores on these two tests were correlated.

RESULTS

Comparison of the Film Versions

Information Test Results. In Table 2 the mean scores on the information test are given for the six groups in the Army and in the Navy. The adjusted means are given in parentheses. Table 3 summarizes the differences among the adjusted information test mean scores.

The findings can be summarized for both the Army and Navy populations as follows:

1. For all film groups substantial learning resulted from viewing the film. In each case, the film group mean score was between one and two standard deviations higher than the mean score of the comparable control group that saw no film.

2. The sound irrelevant group had a lower mean score, in each population, than any other film group. It is to be noted, however, that the visual irrelevant version was the most effective of all the versions containing attention devices for the Army population.

3. The remainder of the inter-film differences were inconsistent for the two populations, and generally insignificant. In the Army, the basic version was consistently more effective than any device version, while in the Navy it was about equal to the two relevant device versions.

4. No significant difference was noted as between the visual devices and the sound devices versions, combined without respect to relevance of devices. For the Navy, the weighted mean of the two visual devices versions was 68.02, as compared with a weighted mean of 67.70 for the sound devices versions. For the Army, the visual devices group mean, without respect to relevance of device, was 48.60, while the sound group mean was 47.61. (These are all adjusted means.)

Results of the Device Recognition Test

The recognition test items were divided into two groups for each film version: (1) those devices that were in the film (Test C_1) and (2) those devices that were not in the film (Test C_2).

TABLE 2

MEAN SCORES AND ADJUSTED MEANS OF
NAVY AND ARMY POPULATIONS ON INFORMATION TEST
AFTER VARIOUS FILM TREATMENTS

Treatment	NAVY N	NAVY Mean	NAVY S.D.	ARMY N	ARMY Mean	ARMY S.D.
Visual Relevant	136	67.63 (69.55)[a]	15.18	248	47.84 (48.02)	17.36
Visual Irrelevant	148	65.45 (66.62)	16.67	229	49.83 (49.24)	17.26
Sound Relevant	135	70.64 (70.68)	14.19	226	48.12 (49.00)	16.31
Sound Irrelevant	155	66.67 (65.11)	15.17	242	46.35 (46.31)	17.71
Basic	331	69.80 (69.52)	15.87	367	52.55 (52.09)	18.80
Control	150	40.57 (39.88)	10.40	264	30.04 (30.41)	9.74

[a] Adjusted means are in parentheses.

TABLE 3

DIFFERENCES AMONG ADJUSTED MEAN SCORES FOR INFORMATION TEST[a]

	VR	VI	SR	SI	B	C
NAVY						
VR	---	---	---	---	---	---
VI	- 2.93*	---	---	---	---	---
SR	+ 1.13	+ 4.06**	---	---	---	---
SI	- 4.44***	- 1.51	- 5.57***	---	---	---
B	- .03	+ 2.90*	- 1.16	+ 4.41***	---	---
C	-29.67***	-26.74***	-30.80***	-25.23***	-29.64***	---
ARMY						
VR	---	---	---	---	---	---
VI	+ 1.22	---	---	---	---	---
SR	+ .98	- .24	---	---	---	---
SI	- 1.71	- 2.93*	- 2.69*	---	---	---
B	+ 4.07***	+ 2.85**	+ 3.09**	+ 5.77***	---	---
C	-17.61***	-18.83***	-18.59***	-15.90***	-21.68***	---

[a] in this table, the mean for the groups listed on the top is subtracted from that of the group listed on the left.

* Significant at the 5 per cent level of confidence
** Significant at the 1 per cent level of confidence
*** Significant at the 0.1 per cent level of confidence

In scoring responses for the C_1 test, which comprised the devices actually in the film, a plus one (+1) was given for each device reported as present, a zero (0) if the subject reported he did not remember, and a minus one (-1) if the device was reported not present. The reverse of the scoring of the C_1 test was used for the C_2 test which comprised all devices not in the version being tested. A plus one (+1) was given for each device reported as not present, a zero (0) if the subject did not remember, and a minus one (-1) for each device reported as present. These scores were totaled for each film version and the tests (C_1 and C_2) correlated with each other as well as with the film information test scores. Table 4 reports these correlations.

All the correlations between the film information test and the C_1 test, and the film information test and the C_2 test, are generally insignificant although positive, indicating that there was only a slight relationship between scores on the film test and the remembering of the devices. The correlation between the C_1 and C_2 tests is also low. In all cases except one, which was practically zero, the correlations were negative. These correlations show that there was a slight tendency for the individual to mark the "not-present" devices as present in the film, if he marked the "present" devices as present. In other words, there was a general tendency to indicate that devices were present, whether they were used or not.

An analysis of responses to the individual items included in the Device Recognition Test revealed two significant points. First, whereas only about half the items included in the VR, SR, and SI versions were recognized by 70 per cent or more of the groups seeing these versions, almost three quarters of the devices in the VI version were correctly recognized by 70 per cent or more of the group seeing this version. In short, the visual irrelevant devices seemed to have called attention to themselves to a greater extent than any other type of device did. Second, whereas a maximum of only 7 devices were falsely recognized (i.e., they were not in the version but the subjects said they were) by 40 per cent or more of the VR, VI, and SR version groups, 15 items were falsely recognized by at least this proportion of the sound irrelevant group. It is suggested that the irrelevant sound devices tended to confuse the subjects so that they were uncertain about what they did hear.

Summary of the Results

The results may be summarized with respect to the three experimental hypotheses as follows:

Device relevancy. There is no evidence that the insertion of relevant devices, as defined in this study, adds to the effectiveness of an informational film. There is some evidence that irrelevant sound devices detract from the teaching effectiveness of such a film. (For both populations, the sound irrelevant version yielded the lowest scores). To a lesser degree there is

TABLE 4

CORRELATIONS BETWEEN DEVICE RECOGNITION TESTS AND INFORMATION TEST: C_1 TEST-DEVICES IN THE VERSION, C_2 TEST-DEVICES NOT IN THE VERSION

Group	C_1 Test and Information Test		C_2 Test and Information Test		C_1 Test and C_2 Test	
	Navy	Army	Navy	Army	Navy	Army
Visual Relevant	.185	.191	.191	.330	-.295	-.079
Visual Irrelevant	.338	.299	.132	.344	.042	.053
Sound Relevant	.223	.092	.141	.203	-.431	-.225
Sound Irrelevant	.107	.075	.073	.150	-.416	-.282
Basic[a]			.214	.334		

[a] Since the Basic Version contained no devices there was no C_1 test score for this group.

evidence that any of the devices used may have the same effect. (For the Army populations the basic version - no devices - yielded the highest score.)

Device medium. No significant difference was found between the effectiveness (or ineffectiveness) of visual and sound attention-gaining devices.

Device recognition. Ability to recognize and remember which devices were used in a film version was practially independent of learning from the version.

CONCLUSION AND RECOMMENDATIONS

Conclusion

This study leads to the general conclusion that attention-gaining devices of the kinds inserted in these films do not add significantly to learning.

Recommendations

The following recommendations are suggested as a result of this investigation:

1. Where instruction is the principal aim, and cost a consideration producers of training films should present the subject matter in a simple, straightforward way and avoid the use of such fancy and expensive devices as spotlighting, zooms, extreme magnification, and stop motion, to gain the learners' attention.

2. If it seems necessary, in an instructional film, to use devices to attract or direct the learners' attention, use a technique which will emphasize something already in the film -- some special treatment of indigeneous materials related to the subject content -- rather than introduce extraneous or irrelevant materials.

The findings of this experiment are largely negative; however, that does not nullify the usefulness of the study. It is almost as important to discover that certain techniques are ineffective, as it is to learn that other techniques are effective. In general, this study corroborates the belief which many educators have held for a long time, that it is not necessary to have a fancy, expensive treatment to convey ideas by means of film, and that simple straightforward film techniques are often the most effective.